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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/945,241	08/31/2001	Fumiaki Matsushima	9319I-000277	1301

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EXAMINER

NGUYEN, HA T

ART UNIT PAPER NUMBER

2812

DATE MAILED: 03/13/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/945,241

Applicant(s)

MATSUSHIMA ET AL.

Examiner

Ha T. Nguyen

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 20 December 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-18 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-18 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____.
- 4) ☐ Interview Summary (PTO-413) Paper No(s). _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

DETAILED ACTION

Notice to applicant

1. Applicant's Amendment and Response to the Office Action mailed 6-14-02 has been entered and made of record (Paper No. 9). The cancellation of claims 19-29 in Paper No. 9 is acknowledged.

Response to Amendment

2. In view of Applicant's argument and amendment to the claims, the rejection of claims 15-18 under 35 U.S.C. 112 second paragraph, has been withdrawn.

In view of new art found the allowability of claims 6, 8, 10, 12, and 14 have been withdrawn.

Applicant's arguments with regard to the rejections under 35 U.S.C. 102 or 103 have been fully considered, but they are not deemed to be persuasive. The response to the arguments will be incorporated in the new rejection below.

Claim Rejections - 35 USC § 102

3. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

4. Claims 1 and 5 are rejected under 35 U.S.C. 102(b) as being anticipated by Saitoh (U. S. Patent 6093964, hereinafter "Saitoh").

[Claim 1] Referring to Figs. 3-8 and related text, Saitoh discloses a method for forming a bump comprising the steps of: forming a resist layer 7 so that a through-hole formed therein is located on a pad 3; and forming a metal post 13 on the pad conforming to the shape of the through-hole (see Fig. 6); wherein the metal post is formed so as to have a shape in which is

formed a recess for receiving a soldering or brazing material 15 (see Fig. 7 and col. 4, lines 47-57); and

[Claim 5] wherein the metal post comprises first and second metal posts, wherein the first metal post is formed in a state in which the resist layer is formed, and the second metal post is formed on the first metal post (see Figs. 8 and 9).

5. Claims 1, 6, 15, and 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Dion (U. S. Patent 5130275).

[Claim 1] Referring to Figs. 2-16 and related text, Dion discloses a method for forming a bump comprising the steps of: forming a resist layer 27 so that a through-hole formed therein is located on a pad 14; and forming a metal post 34 on the pad conforming to the shape of the through-hole (see Fig. 6); wherein the metal post is formed so as to have a shape in which is formed a recess for receiving a soldering or brazing material 34 (see Fig. 7);

[Claim 6] Argument for the rejection of claim 1 also applies. Besides Dion also discloses wherein the metal layer comprises first and second metal layers, wherein the first metal layer is formed in a state in which the resist layer is formed, and after removing the resist layer, the second metal layer is formed so as to cover a surface of the first metal layer (see Figs. 11 and 12); and

[Claims 15 and 17] Referring to Figs. 5-18b and related text, Dion discloses a method for fabricating a semiconductor device comprising the steps of : bonding a plurality of metal posts 18, 26, 34 to a plurality of leads 96 through a soldering or brazing material 44, each of the metal posts formed on each of a plurality of pads 14 of a semiconductor chip (see Fig. 1), each of the metal posts having a shape in which is formed a recess for receiving the soldering or brazing material, wherein the soldering or brazing material, when melted, is allowed to flow into the region of each of the metal posts for receiving the soldering or brazing material so as not to spread onto an adjacent pad of the plurality of pads (see Figs. 18a, 18b).

Claim Rejections - 35 USC § 103

6. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

7. Claims 2-4, 7, 8, 16, and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saitoh or Dion in view of Chen (U.S. Patent 6191023).

Saitoh or Dion discloses substantially the limitations of claims 2-4, 7, 8, 16, and 18, as shown above.

But it does not disclose expressly [Claim 2] wherein the resist layer is formed so as to have a projection on the inner side of the through-hole; [Claim 3] wherein the resist layer is formed so that part of the resist layer remains at the center of the through-hole; [Claim 4] wherein a plurality of the through-holes are formed in the resist layer so that at least a part of each of the through-holes is superposed on the pad, and a plurality of the metal layers are formed, each of the plurality of the metal layers conforming to each of the through-holes to form the region for receiving the soldering or brazing material between the adjacent metal layers of the plurality of the metal layers on the pad; and [Claims 7 and 8] wherein the pad is covered with an insulating film, the resist layer is formed on the insulating film, an opening for exposing at least part of the pad is formed in the insulating film after forming the through-hole in the resist layer, and the first metal layer is formed on the pad in as state in which the resist layer is formed ; [Claim 16] wherein at least one depression is formed in a side of one of the metal posts, and the soldering or brazing material is allowed to flow into the depression; [Claim 18] wherein two or more metal posts of the plurality of metal posts are formed so as to be connected to one of the pads, and the soldering or brazing materials allowed to flow into a region formed between the adjacent metal posts of the plurality of metal posts on one of the pads.

However, the missing limitations are well known in the art because Chen discloses these features (See Figs. 1-3).

A person of ordinary skill is motivated to modify Saitoh or Dion with Chen to obtain improved adhesion to the bond pad with less thermal stress .

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Therefore, it would have been obvious to combine Saitoh or Dion with Chen to obtain the invention as specified in claims 2-4, 7, 8, 16, and 18.

8. Claims 9-14 are rejected under 35 U.S.C. 103(a) as being unpatentable over Saitoh or Dion in view of Watanabe et al. (U. S. Patent 6218281, hereinafter "Watanabe").

Saitoh or Dion discloses substantially the limitations of claims 9-14, as shown above.

But it does not disclose expressly the electroless plating of the first and second metal layers and the materials used for the first and second metal layers.

However, the missing limitations are well known in the art because Watanabe discloses the use of electrolysis plating to form the bump electrode 66 and that the upper interconnect 47b can be formed of Ni (See col. 13 , lines 37-41 and col. 14, lines 3-12).

A person of ordinary skill is motivated to modify Saitoh or Dion with Watanabe to use electroless plating to reduce production cost and to use Ni and Au as materials for the first and second metal layers to obtain better adhesion and better quality.

Therefore, it would have been obvious to Saitoh or Dion with Watanabe to obtain the invention as specified in claims 9-14 .

Conclusion

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Ha Nguyen whose telephone number is (703)308-2706 . The examiner can normally be reached on Monday-Friday from 8:30AM to 6:00PM, except the first Friday of each bi-week.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Niebling, can be reached on (703) 308-3325. The fax phone number for this Group is (703) 308-7722.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the Group receptionist whose telephone number is (703) 308-0956.



Ha Nguyen

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Primary Examiner

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